



# Reeling in Resources

**Grade:** 4

**Subject Areas:**

Life Science, Economics, Performing Arts, Social Studies

**Skills:** classifying, describing, matching, observing, critical thinking

**Duration:** 1-2 hours

**Connections:**

social studies, economics, manufacturing, agriculture, mining, fossil fuels, resource management

**Vocabulary**

natural resources

scarce

fossil fuels

non-renewable

finite

renewable

infinite

depleted

kinetic energy

alternative energy

sustainability

**Objective:**

Students will learn about the natural resources people need to live and the importance of resource management.

**Materials**

- small paper bags (8-12)
- popped pop corn (4 –6 bags of microwave popcorn)
- signs denoting each type of natural resources (F.A.S. S.W.A.M.P)
- crumpled newspaper
- student worksheet
- assorted magazines that will have examples of pictures for all 8 natural resources
- scissors
- 8 folders or envelopes
- background information sheet for students
- items that represent natural resources to draw from (pencil = plant, plastic spoon = fossil fuel, penny = mineral, etc.)
- a bag for drawing items randomly

**Standards**

**Strands: Excellence in Environmental Education Guidelines**

**Strand 1 — Questioning and Analysis Skills: C) Collecting Information:**

Learners are able to locate and collect information about the environment and environmental topics. **F) Working with models and simulations:**

Learners understand that relationships, patterns, and processes can be represented by models.

**Strand 2.3 — Humans and Their Societies: C) Political and economic systems:**

Learners understand that government and economic systems exist because people living together in groups need ways to do things such as provide for needs and wants, maintain order, and manage conflict. **D) Global Connections:**

Learners understand how people are connected at many levels—including the global level—by actions and common responsibilities that concern the environment.

**Strand 2.4 — Environment and Society: C) Resources:** Learners understand the basic concepts of resource and resource distribution.

**Strand 3.2 — Decision-Making and Citizenship Skills: B) Evaluating the need for citizen action:**

Learners are able to think critically about whether they believe action is needed in particular situations and whether they believe they should be involved.

**California State Educational Standards:**

**Life Sciences 3a:** Students know ecosystems can be characterized by their living and nonliving components.

**Investigation and Experimentation (I and E) 6c:** Students will formulate and justify predictions based on cause-and-effect relationships.

# Background

## It Came From...

What does a pizza, a book, and a truck all have in common? They are all made of natural resources. **Natural resources** are naturally occurring substances used to meet human needs and wants. These are the things that sustain us and other living things. The ingredients necessary to make a pizza come mostly from plants and animals. A book is made of paper which usually comes from trees. And, a truck is mostly made of metal, rubber and plastic. In addition, all three of these things require water and energy in order to be produced. Air, water, energy, metals, plants and animals are all examples of natural resources.

Everything people make or use comes from something else. In our modern world, it is often difficult to trace where something comes from. A pizza is mostly made of flour, cheese, and tomato sauce. The flour may have come from Kansas, the tomatoes from Mexico, and the cheese from Wisconsin. It is even more difficult to trace the natural resources used to make something complicated like a truck.

The availability of resources depends on where they come from. Some resources are relatively easy to obtain like water, sunlight and soil. Others may be **scarce** or difficult to obtain like gold, aluminum and some energy resources. In this lesson, eight different natural resources will be highlighted. These are: sunlight, air, soil, plants, animals, water, minerals, and fossil fuels. One way to remember these is to think of "F.A.S.

S.W.A.M.P." (fossil fuels, air, sunlight, soil, water, animals, minerals and plants respectively).

## Here Today

**Fossil fuels** are a unique category of natural resources because they are here temporarily. They include oil, coal and natural gas. Fossil fuels aren't really made from fossils, but are a result of millions of years of accumulated decomposition of ancient plant and animal remains. Because they are temporary, they are called non-renewable resources.

**Non-renewable resources** are those that are in a fixed or **finite** amount and cannot be replaced without millions or even billions of years passing. These include copper, aluminum, and again — fossil fuels. **Renewable resources** are resources that can be replaced relatively rapidly (hours to decades), so they are basically **infinite**. These include things like water in a lake, trees in a forest, and fertile soil. However, if such resources are used faster than they can be replaced, the resources can become depleted. **Depleted** resources, in turn, can be converted to non-renewable ones.

## Local Connection

Have you ever wondered who looks out for wildlife? Several agencies do which can be confusing. The larger more encompassing overseer of fish and wildlife is the US Department of Fish and Game (FWS), also known as the Federal Wildlife Service. Its mission is to work with other organizations to conserve, protect and enhance fish, wildlife, and plants along with the habitats upon which they depend for the continued benefit of the American people. FWS manages national forests, national wildlife refuges and other federal lands.

On a more local level there is the California Department of Fish and Game (DFG). This entity is a state run institution which receives federal funding (similar to the education system). Its main mission is to serve, protect and enhance the fish and wildlife within the state of California. It is divided by region, the northern region servicing the top portion of the state including Mendocino and Humboldt counties. They monitor all habitats including rivers and coastal systems. The DFG is responsible for issuing licenses, setting limits, stocking fish. In addition, the Mattole River Reserve and the Headwaters Forest is partly managed by them.

The Mattole River Ecological Reserve is over 1,300 acres of mixed forests located near the headwaters of the Mattole River. No camping or hunting is allowed here, however, one is free to hike and view wildlife. It preserves habitat for old growth dependent species such as the spotted owl and marbled murrelet. By protecting these sensitive species, more common species benefit such as aquatic life, foxes, salamanders, and many different hawks, ducks and perching birds.

Non-renewable fossil fuels have been sources of cheap energy for over one hundred years. These energy sources, have come at a high cost, however. The burning of fossil fuels has caused a wide variety of environmental problems including smog, acid rain, and indirectly oil spills. Many scientists have found evidence connecting global warming to the burning of fossil fuels. Today there is an increasing demand for cleaner energy alternatives such as solar energy. Energy comes in many forms including heat, light, kinetic, and nuclear. **Kinetic energy** is the energy generated from motion. Wind power, wave power and hydroelectric power all come from the movement of something like air or water. Wind, waves, hydroelectric, and solar power are all examples of cleaner energy sources also referred to as “green” energy or **alternative energy** sources.

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## Here Tomorrow

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As human population continues to grow, natural resources become depleted. Our population size negatively impacts resources by increasing land use pressures and continuing threats such as invasive species, water shortages, and habitat loss. Because resources can become damaged and/or depleted, proper management of natural resources is important. Much time, energy and expense has gone into managing and monitoring resources especially in developed nations like the United States. Some federal and state agencies in place to do this are: the Department of Energy (DOE), The Environmental Protection Agency (EPA), the U.S. Department of Fish and Game (DFG), the Department of Agriculture (USDA) and the Bureau of Land Management (BLM). Many of these organizations are now working in collaborative partnerships with universities and scientists in the hopes of managing resources correctly.

The BLM manages about 261 million

acres in the United States. These lands are often called public lands. They manage natural resources whether they are found on the surface, like forests and streams, or underground, like minerals. The King Range National Conservation Area (NCA) is BLM land. Its mission is to manage and conserve the undeveloped coastal landscapes of the “Lost Coast”. Upon doing so, it strives to protect and enhance watersheds and wildlife habitats. The natural resources here are managed for a variety of uses in a sustainable way.

**Sustainability** occurs when the ways and means by which people develop and use resources today, won’t compromise the ability of future generations to meet their needs. This implies that people need to find ways to conserve resources in order to give adequate time for replacement; such as the case for water, soil and the harvesting of trees. This isn’t happening yet, however. Americans consume resources faster than any other country. Many people throughout the world suffer from food and water shortages. Topsoil has become lost, whole forests have been cut down, and wells have been sucked dry. Through sustainable management practices, it is hoped that future generations of both people and wildlife will be able to meet their basic needs of survival. In Humboldt and Mendocino counties, much of the local economy has been based on logging, ranching and fishing. Most of the large forests and a majority of fish species including the Coho salmon were exhausted relatively quickly because of unsustainable practices. Today, most of the old growth forests are gone. Local rivers are clogged with logging debris and silt, which results largely from runoff from exposed places like dirt roads and exposed hillsides. In addition, water has been diverted from local rivers to southern locations such as the Potter Valley Project. This project has diverted water from the headwaters of the Eel River to Mendocino and Sonoma counties further south, largely for the use in agriculture.

In recent years, much effort has been put into restoring local natural resources in the King Range NCA. The Mattole Restoration Council for instance has been educating people, replanting trees in riparian zones, and monitoring fish in the Mattole river watershed in the hopes of undoing some of the damage done in the past. Humboldt and Mendocino counties in general have become hotbeds of alternative energy solutions and sustainable living communities. For instance, ranchers are raising grass fed beef which reduces pollution and uses less energy. More and more people are using solar power to power their homes and businesses. Farmers are using organic methods and people are trying to eat locally grown foods.

The choices people make have a huge impact on the health and availability of our natural resources. For example, people can choose a paper bag over a plastic bag when they go to the supermarket. Plastic comes from oil, a non-renewable resource. Paper comes from trees, which are considered a renewable resource. However, millions of trees have been cut to make paper products like paper bags, newspaper and cardboard. So which one is better?

Both paper and plastic bags are usually used once and then thrown away or recycled. A better alternative is to use a cloth bag or basket which are re-useable. Re-using things is much more sustainable practice than using things once. This is similar to using a re-useable water bottle instead of a buying a plastic one. By understanding how things are made, where they come from, and knowing about alternatives, people can make wiser choices about our environment. By making wise choices, natural resources can endure well into the future.

# Activity 1: Available Resources

## Preparation

Pop enough popcorn so that each student can have a large handful. Fill as many bags as there are rows of students with a half a bag of popcorn. Fill two more bags with wadded up newspaper to resemble a bag of popped popcorn. Save two or more bags of popcorn for those students who are shorted during the activity.

## Procedure

1. Explain to the students that today they are going to learn about natural resources. Not all resources are divided equally among countries. They should keep this in mind throughout the exercise. Hold up a few paper bags and tell them that inside each bag is an example of a natural resource. Tell them that the bags are going to be passed down each row and when a bag reaches them, they can treat what is inside of it as a newly discovered natural resource. If the students are not in rows, put them in rows of 6-8 students. You do not want rows with any less than 6 students because you are hoping that by the time each bag reaches the last student there will be little or no popcorn left.
2. The wadded newspaper can represent a depleted resource or one of lesser quality; for instance, wood or soil that doesn't approach the same quality that use to be available. This exercise is to begin a discussion about the availability of natural resources and the idea of depletion or shortages of natural resources.
3. Begin passing down the bags of popcorn and newspaper and see what happens. Observe the various reactions of the students, especially those at the beginning and end of each row. Ask some questions regarding their feelings, behaviors and ideas about resource availability.
4. Hand out popcorn to anybody that did not get any, so that there are no hard feelings. Explain to the class that there was a reason why you were hoping some of the popcorn would run out because that is a true reflection of what happens sometimes with resources. Give the class the definition of a natural resource. Tell them they are to classify all natural resources used by humans into eight headings. Begin a discussion. As you do so, write down their responses. (see procedure below)

## Materials

- small paper bags (8-12)
- popped pop corn (4 –6 bags of microwave popcorn)
- signs denoting each type of natural resources (F.A.S. S.W.A.M.P)
- crumpled newspaper
- student worksheet

- *What do you suppose this exercise was trying to model?*
- *Did anybody get shorted? How did that make you feel?*
- *Who received only newspaper? How did that make you feel?*
- *What do you think the newspaper represented?*
- *Did anybody pig out on popcorn? How did that make you feel?*
- *Can anybody come up with a way this exercise models something in the real world?*
- *Let's say a new supply of a certain resource is found in a certain country (example: gold mine in Argentina), does the gold belong to Argentina? (Answer: usually yes; abundance is dictated by location) Does it belong to the business that discovered it?*
- *Can anybody have access to the gold?*
- *Is gold in high demand?*
- *Is there a shortage of gold?*

## Activity 1 continued...

5. As the students give their responses, organize the information on the board or overhead projector so that you will end up with F.A.S. S.W.A.M.P. — the eight key resources listed in the background information for this unit. Underneath the appropriate resource, list any key words or examples the students give.

6. Next, pass out the student worksheet. Give them a little time to fill it in. You will notice that at the bottom, they are to come up with at least one question they have about natural resources. This can wait until the very end of the unit. Define what renewable and non-renewable resources are. See if the students can categorize the eight resources as renewable or non-renewable on their sheet.

- *What are some examples of natural resources? (list all responses)*
- *What is necessary in order to make a \_\_\_\_\_? (repeat this a few times using different items)*
- *Do you think some natural resources are more abundant than others? Which ones?*
- *Do you think some natural resources are scarce (rare)? Which ones?*
- *Do you think some natural resources are more important than others? Which ones?*
- *Can resources be replaced? Which ones?*
- *What do we call these kinds?*
- *What type of resources cannot be replaced in one hundred years?*

7. Explain the importance of resource management. Just as some of them experienced shortages or depleted resources in the earlier activity, explain to them that this happens all the time. There are only so many resources to go around especially those that are finite. Define what the word finite means. It takes time for resources to be replenished. Have them give examples of resources that might be in short supply (copper, oil, gold, and water in some places) and others that tend to be depleted (trees, fish, soil). You may also want to see if they can come up with any solutions to the problems that are created where there is more of a demand for a resource compared to what is available.

8. Lastly, have them make connections to local resources. Ask them to give examples of resources that are abundant and/or scarce locally. See if they know which resources have been unsustainably managed in the past. Stress the importance that since people tend to need and want the same resources, a way needs to be developed to make them last. This is a great time to introduce sustainability or the 4 Rs (reduce, recycle, reuse, and restore). Ask them what they think will happen to people or wildlife if a resource becomes depleted. Begin to have them make their own conclusions and choice of citizen action regarding disappearing resources.

# Activity 2: Resource Charades

## Preparation

The purpose of this activity is to get students familiar with one of the natural resource groups. To do this they will look through magazines, ask questions, and read a background information sheet. Going on the Internet is another option. Once they have spent 15-20 minutes finding examples of their resource, they will select something to act out in a game of charades.

## Procedure

1. Have the students count off as a way to group them. Once the students are in groups of 3-5 have someone from each group select their topic randomly by reaching into a bag. If using select items instead of labeled cards, have the students guess which of the 8 natural resources each item represents. Hand out at least one copy of the background information sheet to each group along with scissors, an envelope and an assorted pile of magazines. Do not allow any group to start until all groups have selected their resource topic.
2. Next, have the students find examples of items that fall within their selected resource. For instance, if a group has soil as their topic, they should find pictures of plants, worms, dead leaves, fertilizers, etc. These should be cut out and placed into an envelope. Explain to them that as they find their pictures, they should think about a few they would like to act out in a game of charades.
3. Once everybody has had enough time to find several examples, begin. Gather everybody into a common area. As a group, or alone, have the students act out one of their examples (For example, a worm). After every round, ask the class, to predict which of the 8 natural resources the example belongs to. This will reinforce the idea that everything comes from something else.
4. There are several options when playing charades. For instance, you may want to have the students randomly select one of their pictures and not give them a choice about which item they have to act out. It is not necessary that every student act out either. Usually there are a few students who love to act and others that are uncomfortable doing so. When everyone has finished, review what they have learned.

## Materials

- assorted magazines that will have examples of pictures for all 8 natural resources. (gardening, natural history, popular science, etc.)
- scissors
- 8 folders or envelopes; one for each resource group
- background information sheet for students (see attached)
- items that represent natural resources to draw from (pencil = plant, plastic spoon = fossil fuel, penny = mineral, etc.) You can also use labeled pictures for this.
- a bag for drawing items randomly

## Extensions

- Using the selected pictures from Activity 2 , have the students make a natural resource collage or informative poster.
- Research different products to find out which ones are recyclable and which ones are not.
- Invite a local resource manger or organic farmer in to the classroom to talk about what they do to protect natural resources.
- Learn about the local animals and plants of your area by visiting the community park, the King Range NCA or a nearby redwood park.
- Perform plant experiments by exposing them to various fertilizers or hours of sunlight.
- Learn songs relating to earth and its natural resources. See the Banana Slug String Band.
- Have the students make slogans or advertisements promoting sustainable development.
- Begin a letter writing campaign about a depleted resource and the need for sustainability.

## References

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## FOSS Connection

Grade 4  
Earth Science: Earth Materials  
Alternative Modules:  
Matter and Energy

## Natural Resources (background information for students):

There are 8 categories often used to represent most of natural resources used by people. These can be remembered by using F.A.S. S.W.A.M.P. F.A.S. S.W.A.M.P. stands for: fossil fuels, air, sunlight, soil, water, animals, minerals and plants. Below you will find some information about each of these resources and whether they are usually renewable or non-renewable.

<b>Natural Resources</b>	<b>renewable or non-renewable</b>	<b>Background</b>
Fossil fuels	non-renewable	Humans need energy to generate electricity and operate machinery. All types of items from cars to computers need an energy source. In order to have lights, movies, and microwaves, electricity is needed. Most energy, especially electricity, comes from the burning of fossil fuels.
Air	renewable	Humans need clean air to breathe and stay alive. Air is full of oxygen and nitrogen mostly but also contains water.
Sunlight	renewable	Humans depend on sunlight which provides energy for plants to grow. Sunlight also powers the water cycle which is necessary to replenish lakes and rivers. Sunlight is used for solar power. In addition, sunlight is necessary for trees to grow which are used for housing, furniture and heating.
Soil	renewable	Humans need healthy soil in order to grow crops. When soil gets depleted chemicals are necessary in order to grow food. Soil reduces erosion and is full of microorganisms that break down dead materials. Trees and other important plants need soil to grow.
Water	renewable	Humans and animals need clean sources of water to stay alive. Water is used for growing crops. Water is also important for cleaning everything from our bodies and teeth to our cars. A lot of water is used in to make goods and to cool down machinery.
Animals	renewable	Humans use animals for food and clothing. Fish are a very important food source for many peoples of the world. Cows, pigs, chickens and sheep are domestic animals that provide meat, leather, eggs, milk products and wool. The droppings of animals or manure is used to fertilize plants
Minerals	non-renewable	Humans use minerals to manufacture thousands of different items. Silica is a common mineral found in sand and is used to make glass. Bauxite is used to make aluminum which is commonly used in vehicles. Copper is very important in electronics like computers and cell phones.
Plants	renewable	Animals including humans breathe oxygen which plants make during photosynthesis. Humans use many different plants for food, clothing and building materials. Wood is used to heat homes. Corn and other secondary plant materials or byproducts are used as biofuels. Many medicines are produced from plants.

<b>Natural Resources</b>	<b>renewable or non-renewable</b>	<b>Examples</b>
Fossil fuels	non-renewable	Anything made of plastic (there are a few exceptions). Parts of cars, games, computers, toys, furniture, packaging, telephones, stereos, TV, etc. are made of plastic. Gasoline, diesel, propane and other fuels are also made from oil.
Air	renewable	Space is filled up with air. Pictures of outside or inside as long as some space is shown work for examples of air.
Sunlight	renewable	The most obvious example is the sun. However, indirectly sunlight is how plants grow. So pictures of plants work also.
Soil	renewable	Plants need soil in order to grow, so again, pictures of plants will work to represent soil. Better yet, however, is to find pictures of soil and or farmland.
Water	renewable	There are many things that are made from water. Anything alive is made of water. Pictures of rivers, lakes, faucets, hoses, sinks, bathtubs, swimming pools are also relevant here.
Animals	renewable	Obviously pictures of animals work well for this. However, don't forget that many products are made from animals like wool, leather, beef, chicken, milk, eggs and cheese.
Minerals	non-renewable	The list of examples of things made of minerals is long. Here are a few examples: paint, all electronics, jewelry, any thing metal,
Plants	renewable	Plants are some of the more numerous things living on the planet. Forests, lawns, and flower gardens are all good examples. Don't forget that many things are made of plants including cloth, wooden houses, fruit, nuts, vegetables, and wooden furniture.

Name: \_\_\_\_\_

Date: \_\_\_\_\_

# Characteristics of Rocks

1. What is a natural resource? \_\_\_\_\_  
\_\_\_\_\_

2. Identify the 8 categories of NR by filling in the words:

F \_\_\_\_\_

A \_\_\_\_\_

S \_\_\_\_\_

S \_\_\_\_\_

W \_\_\_\_\_

A \_\_\_\_\_

M \_\_\_\_\_

P \_\_\_\_\_

3. What is a renewable resource? \_\_\_\_\_  
\_\_\_\_\_

4. What is a non-renewable resource? \_\_\_\_\_  
\_\_\_\_\_

5. List three problems associated with non-renewable resources. \_\_\_\_\_  
\_\_\_\_\_

6. What steps can people take to properly manage resources? \_\_\_\_\_  
\_\_\_\_\_

7. Pretend you are a resource manager. List one way you would manage a resource. \_\_\_\_\_  
\_\_\_\_\_

8. Write a question concerning a local natural resource.  
For example: "How much energy could be generated from 10 large wind turbines?"  
"How many acres of forestland have been cut for timber in Humboldt County?"  
\_\_\_\_\_  
\_\_\_\_\_